

## Micro-emulsified CoQ10 in 100 mg and 200 mg softgels

By David M. Brady, ND, DC, CCN, DACBN & Suzanne Copp, MS

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Q-Evail® provides highly bioavailable ubiquinone, also known as coenzyme Q10 (CoQ10). Ubiquinone derives its name from the word "ubiquitous," because it is present everywhere in the human body. The number ten refers to the biochemical structure of CoQ10, which consists of ten isoprene units attached to a benzoquinone "head."<sup>1,2</sup> CoQ10 is especially important as a key component of the mitochondrial electron transport chain, making it critical for cellular energy (ATP) generation. For this reason, organs and tissues with high energy demands, such as the heart, skeletal muscles, kidneys and liver, have the highest concentrations of CoQ10.<sup>3</sup>

CoQ10 is also one of the body's most crucial lipid-soluble antioxidants (it is in fact the only endogenously synthesized fat-soluble antioxidant<sup>4</sup>), helping to protect the structural lipids in circulating lipoprotein particles as well as mitochondrial and lysosomal membranes from oxidative damage. In being reduced to ubiquinol and then oxidized to ubiquinone, it also serves to recycle other antioxidants, such as vitamins C and E.<sup>1,5-8</sup> CoQ10 may help support healthy aging, physical energy levels, mitochondrial health, and neurological function.<sup>9-11</sup>

Q-Evail® is manufactured using Designs for Health's proprietary Evail emulsification technology, which improves bioavailability and absorption of CoQ10. This process uses medium chain triglycerides (MCTs), sunflower lecithin (soy-free), and vitamin E (DeltaGold® tocotrienols and tocopherols).

### CoQ10 Demystified

CoQ10 exists in both ubiquinone and ubiquinol forms. In the mitochondrial electron transport system CoQ10 undergoes continuous reversible oxidation and reduction. It is converted to ubiquinol (reduced form) when it accepts electrons and to ubiquinone (oxidized form) when it donates electrons. In its ubiquinol form, CoQ10 functions as a potent antioxidant due to its ability to donate electrons, thus serving as a primary scavenger of free radicals and protecting against lipid peroxidation in cell membranes and lipoprotein particles. As an antioxidant that also protects lysosomal membranes, CoQ10 may play an important role in proper functioning of the immune system and clearance of cellular waste products. Additionally, digestive enzymes within lysosomes function optimally in an acidic environment; CoQ10 facilitates maintenance of the proper pH.<sup>1</sup> Most healthy individuals are able to convert ubiquinone to ubiquinol. It has been demonstrated that 80-95% of circulating CoQ10 following oral ingestion of a ubiquinone supplement is in the form of ubiquinol.<sup>12,13</sup>

### Why supplement with CoQ10?

CoQ10 is synthesized in the body and can also be obtained in small amounts from certain dietary sources, such as fish, poultry and beef (organ meats, in particular), with smaller amounts occurring in plant foods. However, endogenous synthesis and CoQ10 obtained through the diet may be inadequate to meet the body's demands under certain circumstances. For example, older age, various illnesses, and the use of select medications increase the need for CoQ10.<sup>1,14,15</sup>

Statin drugs, used for lowering cholesterol, are the most well-known pharmaceutical factors that impair CoQ10 synthesis. CoQ10 is synthesized via the mevalonate pathway—the same biochemical pathway upon which statins exert their effects through inhibition of the enzyme HMG CoA reductase. These drugs negatively impact CoQ10 synthesis because synthesis occurs several steps subsequent to enzyme inhibition. Along with decreasing production of cholesterol, itself, the effect of statins on decreasing the supply of CoQ10 is "without question a major problem, and is responsible for many, if not all, of the side-effects associated with statins."<sup>16</sup> The effect of these commonplace drugs is so profound that researchers have posited that "statins may be causative in coronary artery calcification and can function as mitochondrial toxins that impair muscle function in the heart and blood vessels through the depletion of coenzyme Q10 and 'heme A', and thereby ATP generation."<sup>17</sup>

Cardiac muscle has a very high demand for energy and reducing synthesis of CoQ10 would logically have a major impact on the heart's capacity to generate this energy. Statins are associated with cardiomyopathy and may even be a contributing causal factor in heart failure (particularly with preserved ejection fraction).<sup>18</sup> Administration of CoQ10 in conjunction with statin discontinuation has been shown to be helpful for individuals in this context and significantly improved measures of cardiac function as well as

### Benefits of CoQ10:

- Supports cellular energy generation
- Promotes efficient cardiac function
- Key antioxidant; helps recycle other antioxidants such as vitamins C and E
- Supports healthy aging
- Helps maintain proper pH of lysosomes to aid in immune function and clearance of cellular wastes
- Promotes healthy neurological function

statin-associated side-effects such as fatigue, memory loss, peripheral neuropathy, myalgia and muscle weakness.<sup>18</sup>

Cardiac muscle is not the only muscle that may be negatively impacted by statin drugs. Statin-associated muscle symptoms (SAMS) affecting skeletal muscle (aches ranging from minor to severe, muscle cramps, weakness, and in rare instances, rhabdomyolysis) are likely due to depletion of CoQ10: “Since CoQ10 is fundamentally important to mitochondrial function and cellular energy production (ATP), the depletion of CoQ10 and resultant mitochondrial dysfunction is hypothesized as the primary pathophysiologic cause of SAMS. Therein lies the rationale for using exogenous supplementation of CoQ10 to ameliorate SAMS.”<sup>2</sup> Evidence is somewhat mixed, but on the whole, findings support the use of CoQ10 to ameliorate the effects of statins with regard to myopathy,<sup>19</sup> including a 2018 meta-analysis of RCTs published in the *Journal of the American Heart Association*.<sup>20</sup>

Statin-induced cognitive decline is another area of concern for medical professionals and their patients. This is a controversial area, but an analysis from 2019 concluded that statin-associated cognitive decline is indeed a legitimate entity and that one of the mechanisms likely contributing is “reduction of synthesis of coenzyme Q10 with consequent increasing oxidative stress and reduction of cerebral energy production.”<sup>21</sup> (The US FDA acknowledges the potential for “cognitive side effects [memory loss, confusion, etc.]” from statin use and requires this disclosure on statin labels.<sup>22</sup> Aside from statins, other drugs that have been found to decrease serum CoQ10 include gemfibrozil, select chemotherapy drugs (anthracyclines), and beta blockers.<sup>14</sup>

CoQ10 supplementation may be beneficial for patients with cardiac concerns unrelated to statin use. Heart failure (HF) is “inherently an energy deprived state”<sup>23</sup> and several systematic reviews indicate that CoQ10 supplementation is beneficial for individuals with HF.<sup>24</sup> Patients with HF have been shown to have myocardial CoQ10 deficiency, and this correlates with symptom severity and left ventricle ejection fraction (LVEF). In patients with HF, compared to placebo, CoQ10 has been documented to significantly improve cardiac output, stroke volume and LVEF.<sup>25</sup> Researchers note that as an adjunctive treatment for HF, CoQ10 is safe and “improves symptoms and functional status, and reduces major adverse cardiovascular events, such as death from HF, sudden cardiac death, and hospitalization due to HF worsening.”<sup>25</sup> In addition to death from cardiovascular events, CoQ10 supplementation was also shown to significantly reduce all-cause mortality compared to placebo.<sup>26,27</sup>

Beyond cardiovascular concerns, a range of neurodegenerative disorders, various cancers, diabetes, fibromyalgia and other muscle disorders have been associated with low CoQ10 levels.<sup>28</sup> Among patients with fibromyalgia (FM) treated with pregabalin, CoQ10 supplementation resulted in reductions in pain and anxiety, inflammation and mitochondrial oxidative stress. CoQ10 also increased levels of glutathione and superoxide dismutase in FM patients.<sup>29</sup> Research is mostly mechanistic at this point, but CoQ10 may have potential as an adjunct to therapies for various mitochondrial disorders, Parkinson’s disease, Huntington’s disease, amyotrophic lateral sclerosis (ALS), select ataxias and other conditions linked to mitochondrial dysfunction.<sup>30,31</sup> Human and animal research also support use of CoQ10 for retinal diseases such as macular degeneration, glaucoma, and potentially diabetic retinopathy and retinitis pigmentosa.<sup>32,33</sup>

#### Consider these other Designs for Health Products:

- Owing to a natural decline in ability to convert ubiquinone to ubiquinol during aging, consider recommending CoQno1™ (highly absorbable ubiquinol), as an alternative CoQ10 supplementation for elderly subjects (Greater than 70 years of age).
- Q-Evail® may be taken along with Mitochondrial NRG™ for additional mitochondrial support and improvement in overall cellular and tissue vitality and health.
- For patients taking statin drugs, consider using Annatto-GG™ 150 to support endogenous CoQ10 synthesis.

For a list of references cited in this document, please visit:

<https://www.designsforhealth.com/techsheet-references/q-evail-references.pdf>

Dosing recommendations are given for typical use based on an average 150 pound healthy adult. Healthcare practitioners are encouraged to use clinical judgement with case-specific dosing based on intended goals, subject body weight, medical history, and concomitant medication and supplement usage.

DeltaGold® is a registered trademark of American River Nutrition, LLC and protected by US Patent Numbers 6,350,453 and 8,586,109.

\*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease

#### Q-Evail™ 100

### Supplement Facts

Serving Size 1 softgel

Amount Per Serving	% Daily Value
Coenzyme Q10 (Ubiquinone)	100 mg *

\*Daily Value not established.

**Other Ingredients:** Bovine gelatin, purified water, glycerine, medium chain triglycerides, sunflower lecithin, DeltaGold® tocotrienols, tocopherol, annatto (color).

#### Q-Evail™ 200

### Supplement Facts

Serving Size 1 softgel

Amount Per Serving	% Daily Value
Coenzyme Q10 (Ubiquinone)	200 mg *

\*Daily Value not established.

**Other Ingredients:** Bovine gelatin, purified water, medium chain triglycerides, glycerine, sunflower lecithin, DeltaGold® tocotrienols, tocopherol, annatto (color).

#### Recommended Use:

As a dietary supplement, take one softgel per day with a meal, or as directed by your health care practitioner.

To contact Designs for Health, please call us at (860) 623-6314, or visit us on the web at [www.designsforhealth.com](http://www.designsforhealth.com).